

Fieldwork

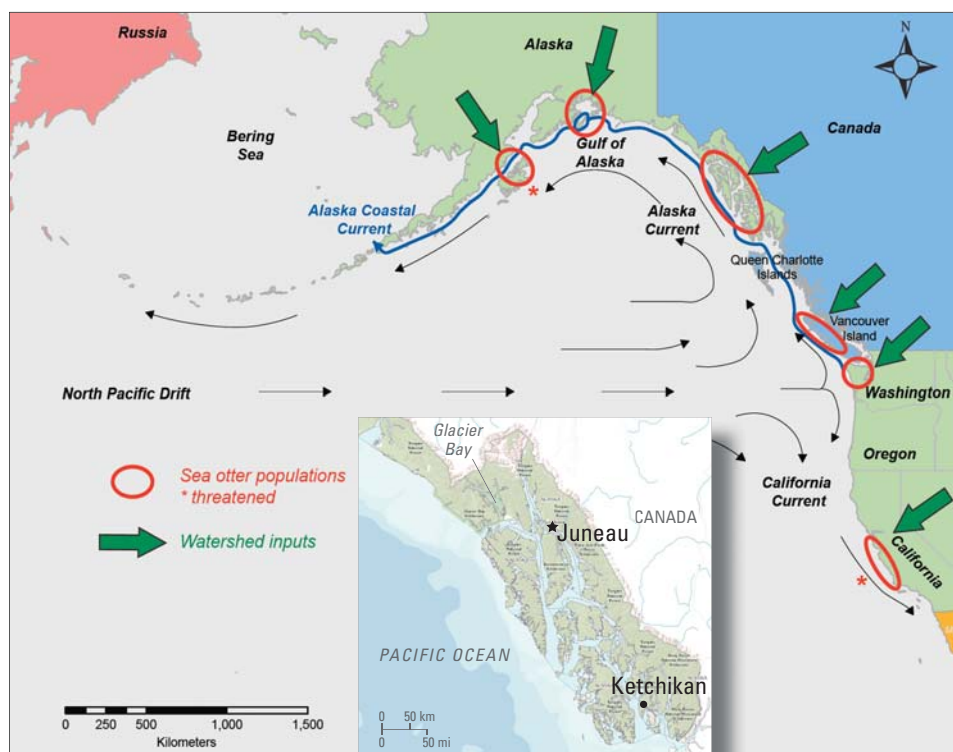
Alaska Sea Otter Expedition Investigates Coastal Health

By Ben Young Landis

Marine biologists recently conducted a 3-week expedition studying sea otters as part of a joint U.S.-Canadian project to investigate the ecological health of the Pacific coastline.

The Pacific Nearshore Project is a multinational, multiagency project investigating sea otters as indicators of the health of coastal waters and marine resources from California northward through Canada and Alaska. (See related *Sound Waves* article at <http://soundwaves.usgs.gov/2010/03/>.) A major component of the investigation was conducted in late May and early June 2011, when 16 researchers from four research institutions sailed between Juneau and Ketchikan, Alaska, capturing sea otters for physical exams, biopsies, and blood tests, observing sea otter feeding behavior, and collecting samples from fish and other species that hold clues to ecological health.

➤ Researchers board the USGS research vessel *Alaska Gyre* before embarking on the latest expedition of the Pacific Nearshore Project: (left to right) **Tim Tinker** (USGS), **Mike Murray** (Monterey Bay Aquarium), **Michelle Staedler** (Monterey Bay Aquarium), **George Esslinger** (USGS), **Mike Kenner** (University of California, Santa Cruz), project leader **Jim Bodkin** (USGS), and **Jim Estes** (University of California, Santa Cruz). Photograph by **Keith Miles**, USGS.



“Sea otters are the perfect health indicators of our nearshore waters,” said **James Bodkin**, a U.S. Geological Survey (USGS) research biologist and the project’s chief scientist. “They’re entirely dependent on nearshore marine habitats, and they are keystone species in kelp-forest food webs. Some populations are abundant and stable, while others are either declining or struggling to reach healthy numbers. Can these differences be explained by ocean influences, or by human impacts to the adjacent watersheds? That’s what we’re hoping to learn.”

(Sea Otter Expedition continued on page 2)

➤ Geographic bounds and conceptual components of the Pacific Nearshore Project, including six geographically distinct sea otter populations (from west to east): Katmai, Prince William Sound, Southeast Alaska, British Columbia, Washington, and California. The sea otter population in Southeast Alaska (enlarged in inset map) was the focus of the May/June 2011 expedition.

Sound Waves

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Submission Guidelines

Deadline: The deadline for news items and publication lists for the September issue of *Sound Waves* is Thursday, July 14.

Publications: When new publications or products are released, please notify the editor with a full reference and a bulleted summary or description.

Images: Please submit all images at publication size (column, 2-column, or page width). Resolution of 200 to 300 dpi (dots per inch) is best. Adobe Illustrator® files or EPS files work well with vector files (such as graphs or diagrams). TIFF and JPEG files work well with raster files (photographs or rasterized vector files).

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Need to find natural-science data or information? Visit the USGS Frequently Asked Questions (FAQ's) at URL <http://www.usgs.gov/faq/>

Can't find the answer to your question on the Web? Call 1-888-ASK-USGS

Want to e-mail your question to the USGS? Send it to this address: ask@usgs.gov

Fieldwork, continued

(*Sea Otter Expedition continued from page 1*)

The Alaska expedition is among the last of several sampling missions that began in 2008 at locations that include Big Sur in California and the Katmai coast of Alaska. During the next 2 years, the project researchers will continue to act as detectives, piecing together clues from DNA analysis, disease and toxin studies, sea otter diets, fish growth rates, and satellite imagery to assess and compare the health of some of North America's most iconic coastlines.

"It's not so much 'CSI: Sea Otters' as it is 'CSI: Coastal Health,'" said **Seth Newsome**, a University of Wyoming researcher analyzing the chemical signature of otter whiskers and fish muscle tissue collected from the expedition. "Sea otter health and diet tells us a great deal about the quality of their marine habitat—the same habitat that supports our fisheries and our recreational waters."

Taking whiskers from wild, ill-tempered otters isn't easy, but the captured animals were safely sedated during the biopsies. "We actually use the same anesthetics that doctors use for colonoscopy exams in humans," says **Mike Murray**, chief veterinarian at the Monterey Bay Aquarium. **Murray** served as the expedition veterinarian, operating a mobile "otter-examination clinic" on the USGS research vessel *Alaska Gyre*.

"We have colleagues who are using groundbreaking techniques to solve this mystery, including a blood test that can show whether an otter has been exposed to oil, parasites, or other types of stress," said USGS ecologist **Keith Miles**, a co-leader in the project. "This is an extraordinary collaboration among government agencies, research institutes, and universities working together to understand our

(*Sea Otter Expedition continued on page 3*)



Expedition scientists release a sea otter back into the ocean after a full health checkup.

Fieldwork, continued

(Sea Otter Expedition continued from page 2)



Although their focus is on sea otters, Pacific Nearshore Project scientists study other organisms in the nearshore food web as well. Here, **Hans Bruning** (left; first mate on the Snow Goose) and **Tim Tinker** (right) watch as USGS biologist **Vanessa von Biela** dissects kelp greenling for their otoliths—earbones whose growth rings can reveal a fish's age and indicate how fast the fish grew in certain years. Learn more at <http://www.werc.usgs.gov/ProjectSubWebPage.aspx?SubWebPageID=3&ProjectID=221>.

coastal resources. We'll all be learning something new."

The Pacific Nearshore Project is led by the USGS, with key research partners from the Monterey Bay Aquarium, the Department of Fisheries and Oceans Canada, the National Park Service, the U.S. Fish and Wildlife Service, the Seattle Aquarium, the University of California, the University of Idaho, the University of Wyoming, and the California Department of Fish and Game.

A sample field-journal entry, for Day 7 of the expedition (May 28, 2011), is reprinted in this issue (<http://soundwaves.usgs.gov/2011/07/fieldwork2.html>), and links to all the journal entries are in the sidebar at right. For additional

information, including more photographs, a full list of sponsoring agencies, and details about the types of data being gathered, please visit the project homepage at <http://www.werc.usgs.gov/project.aspx?projectid=221>. ❄

Expedition biologists must carefully clamber up and down rocky cliffs to find the best lookout for observing sea otter behavior.



Pacific Nearshore Project 2011 Alaska Expedition

Field Journal

Day 1: Leaving Port:

<http://www.werc.usgs.gov/outreach.aspx?RecordID=66>

Day 2: First Captures:

<http://www.werc.usgs.gov/outreach.aspx?RecordID=67>

Day 3: Feeding Behavior:

<http://www.werc.usgs.gov/outreach.aspx?RecordID=68>

Day 4: Earbone Sleuths:

<http://www.werc.usgs.gov/outreach.aspx?RecordID=69>

Day 6: Capture Dives:

<http://www.werc.usgs.gov/outreach.aspx?RecordID=70>

Day 6: Motherhood and Science:

<http://www.werc.usgs.gov/outreach.aspx?RecordID=71>

Day 7: Jack of All Trades:

<http://www.werc.usgs.gov/outreach.aspx?RecordID=72>

Week 1: Photo Gallery:

<http://www.werc.usgs.gov/outreach.aspx?RecordID=73>

Day 9: To Sitka:

<http://www.werc.usgs.gov/outreach.aspx?RecordID=75>

Day 10: Comparing Otters:

<http://www.werc.usgs.gov/outreach.aspx?RecordID=76>

Day 14: Birthday Cake:

<http://www.werc.usgs.gov/outreach.aspx?RecordID=77>

Day 15: Otter Physical:

<http://www.werc.usgs.gov/outreach.aspx?RecordID=78>

Day 19: Closing Thoughts:

<http://www.werc.usgs.gov/outreach.aspx?RecordID=79>



Gena Bentall

Research divers take a break from a gray and gloomy day out on the water.



Field Journal: Pacific Nearshore Project Alaska Expedition, Day 7

SATURDAY MAY 28 2011

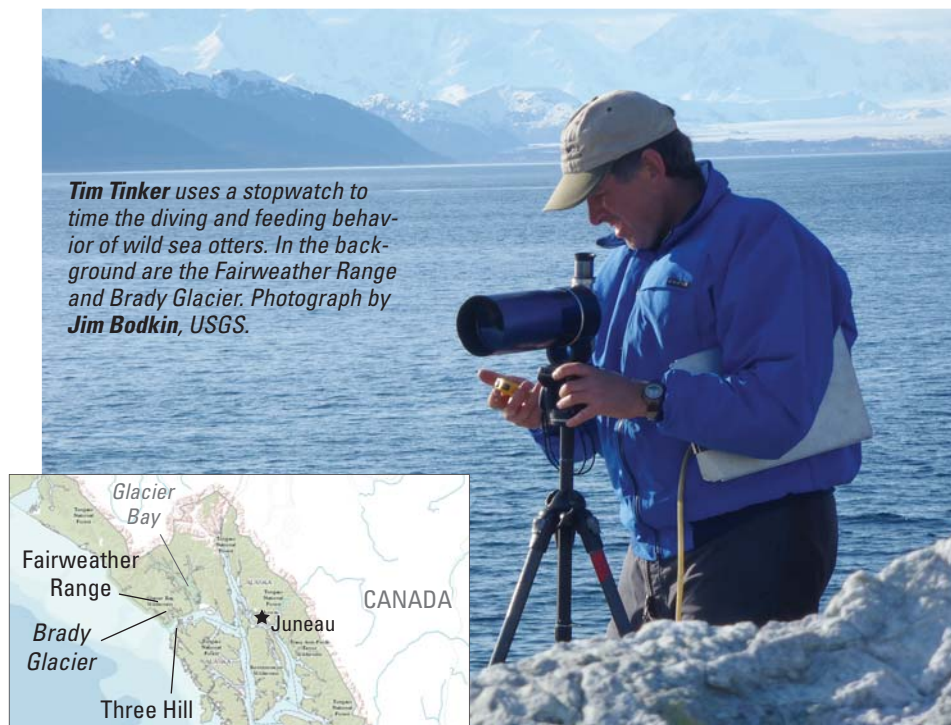
By Tim Tinker

*Editor's note: During the Pacific Nearshore Project 2011 Alaska Expedition (see "Alaska Sea Otter Expedition Investigates Coastal Health," <http://soundwaves.usgs.gov/2011/07/>), researchers shared stories about their shipboard life through journal entries posted on the USGS Western Ecological Research Center Web site at <http://www.werc.usgs.gov/project.aspx?projectid=221>. This entry for Day 7 is by **Tim Tinker**, USGS research wildlife biologist and a co-leader of the expedition.*

By the end of the first week of a research cruise, the whole crew tends to "find its groove," with the initial bugs getting worked out and group dynamics settling in to that of a comfortable extended family.

Today was another fun and productive day, and we passed an important milestone: 30 sea otters have been captured, studied and released; we have 50 feeding observation bouts collected; and all fish sampling is complete. [A "bout," or "forage bout," consists of data collected as a sea otter makes a series of dives during one feeding session; for this study, a set of data collected during five or more consecutive dives per individual sea otter was counted as a "bout."] A combination of a highly experienced and skilled crew, cooperative weather, and a dash of good luck have allowed us to finish all tasks for the northern study site a day ahead of schedule, so tomorrow we will begin travel to our southern study site, Whale Bay.

As one of the co-leaders of the expedition, my role is to be sort of a "jack of all trades," focusing on collection of sea otter diet data but also helping out with all other tasks as needed. Today for instance, I was the boat handler for a dive capture crew in the morning, "tended nets" in the afternoon—we extracted four otters that had been safely captured in these floating tangle nets—and finished the day by helping the vet crew back at the *Alaska Gyre* with measurements and sample collection



Tim Tinker uses a stopwatch to time the diving and feeding behavior of wild sea otters. In the background are the Fairweather Range and Brady Glacier. Photograph by **Jim Bodkin**, USGS.



*Southeast Alaska. **Tim Tinker** conducted the sea otter observations described in this journal entry from a tiny islet near Three Hill Island.*

from the anesthetized otters.

Yesterday, I was on "feeding-data duty," and so I headed over to a tiny islet that I knew had a perfect look-out spot for sea otter observations. After stern-anchoring my skiff (so that it rode the waves safely offshore) and then scrambling up the craggy cliffs that ringed the island, I was rewarded by a spectacular view: an archipelago of picturesque islands dotted the ocean nearby, while the Brady Glacier and Fairweather mountains loomed in the background. Kittiwakes and bald eagles wheeled overhead, a large male Steller sea lion thrashed a salmon in the surf below me, and a humpback whale broke the surface in the distance.

Scanning around with binoculars I saw a couple of feeding sea otters, including a mother and large pup about 500 yards

away, so I quickly set up the telescope, grabbed my stopwatch and notepad, and started recording data:

Dive 1: 118 seconds submerged, 72 seconds on the surface, 1 butter clam (size 2b) and 4 soft shell clams (size 1c), 2 of which were shared with the pup.

Dive 2: 127 seconds submerged, 102 seconds on the surface, 3 soft-shell clams (size 1c) and 1 helmet crab, size 2a.

And so it continued, dive after dive, otter after otter, until I had recorded over a hundred dives from six different animals. By late afternoon most of the sea otters in the area had finished their feeding and rafted up, with about 20 nestled in a hidden cove on nearby Three Hill Island. I hailed a dive crew on the VHF radio, letting them know I had a suitable "target" for capture, and 10 minutes later one of our skiffs glided into view with **Mike [Kenner, USGS]** at the helm and **Jim**

(Field Journal continued on page 5)

Fieldwork, continued

(Field Journal continued from page 4)

[**Bodkin**, USGS] and **Ben [Weitzman]**, University of California, Santa Cruz] eager to dive.

To avoid alerting the otters to their presence, they anchored up the skiff behind a headland and quickly suited up. I was able to guide the divers into the cove by providing them with radio instructions at each of their “head checks.” [Capture divers must stay underwater as much as possible to avoid spooking otters. Occasionally, divers have to surface for a “head check” to make sure they’re still swimming in the target otter’s direction, before diving down again.]

Within minutes, I was rewarded by the sight of two Wilson traps breaking the surface simultaneously under two of the otters: they had made a text-book double capture.

All in all a perfect day, and as I started the climb down to my skiff I startled a sleeping river otter: unknowingly we had both been sharing the same small island for the last few hours.

To read more about the expedition, see “Alaska Sea Otter Expedition Investigates Coastal Health,” this issue (<http://soundwaves.usgs.gov/2011/07/>), and visit <http://www.werc.usgs.gov/project.aspx?projectid=221>. ☼



▲ USGS research divers ride motorized “scooters” with mounted Wilson traps in preparation for a sea otter capture during the 2010 Alaska expedition. Photograph by **George Esslinger**, USGS.

◀ Motorized scooters help divers rush toward the surface to safely net otters. Photograph by **George Esslinger**, USGS.

Meetings

Strengthening Coastal Research Partnerships at Coastal Sediments ‘11

By **Ann Tihansky** and **Guy Gelfenbaum**

Scientists and engineers from across the globe gathered in Miami, Florida, in early May for the 7th International Symposium on Coastal Engineering and Science of Coastal Sediment Processes, a.k.a. Coastal Sediments ‘11. Begun in 1977 and now held every 4 years, the conferences provide a forum for exchange of information among coastal engineers, geologists, marine scientists, shallow-water oceanographers, and others interested in the physical processes that move coastal sediment and change the shape of the coast.

The U.S. Geological Survey (USGS) was one of the cooperating organizations that made this year’s meeting possible, along with the U.S. Army Corps of Engineers’ Coastal and Hydraulics Laboratory, the University of South Florida’s Coastal Research Laboratory, Lund University (Sweden), the Florida Institute of Technology, Humiston and Moore Engineers, the Florida Shore and Beach Preservation Association, the Geological Society of America, and the American Shore and Beach Preservation Association.

USGS researcher oceanographer **Guy Gelfenbaum** served on this year’s or-

ganizing committee, with **Julie Rosati** of the U.S. Army Corps of Engineers, **Ping Wang** of the University of South Florida, **Mohamed Dabees** of Humiston and Moore Engineers, **Hans Hanson** of Lund University, and **Gary Zarillo** of the Florida Institute of Technology.

The program included short courses, field trips, and three days of technical talks on such topics as beach nourishment, sea-level change, shoreline change, inlets, coastal dunes, shelf and sand bodies, barrier-island evolution, navigation channels, sediment-transport measurement

(Coastal Sediments ‘11 continued on page 6)

Meetings, continued

(Coastal Sediments '11 continued from page 5)

and modeling, lidar (light detection and ranging) and other remote-sensing techniques, the northern Gulf of Mexico, river deltas, marshes and wetlands, bars, spits, and storms.

Nearly 20 USGS scientists from across the nation attended the conference. **Guy Gelfenbaum**, **Jeff List**, **Abby Sallenger**, **Chris Sherwood**, **Hilary Stockdon**, **David Twichell**, and **Jeff Williams** chaired technical sessions, and **Nathaniel Plant** held a listening session along with **Craig Weaver** and **Ann Tihansky** to gather non-USGS perspectives about USGS products, priorities, and future directions. Numerous technical talks were presented by USGS scientists, and a USGS booth offered handout materials representing the broad scope of the agency's coastal and marine research.

One goal of the symposium is to foster the exchange of information across the broad fields of science and engineering. This year's two keynote speakers were Canadian Emeritus Professor of Coastal Engineering at Queen's University **William Kamphuis**, who discussed "Coastal Engineering—Theory and Practice," and USGS research oceanographer **Abby Sallenger**, who presented "Hurricanes, Sea-Level Rise, and Coastal Change."

Sallenger, who is helping to write the Intergovernmental Panel on Climate Change's Fifth Assessment Report, due to be released in 2013/2014 (see <http://www.ipcc.ch/>), shared global perspectives in his keynote address. "Global patterns in sea-level change show definite hotspots," said **Sallenger**. "For example, 59 percent of the Gulf of Mexico shoreline has been affected by storms and significant change within the last 10 years, while the northeast U.S. has seen accelerated sea-level rise since the 1940s." Although the global rate of sea-level rise is between 1 and 2 mm/yr, local and regional rates vary because of local effects. Sediment supply and sea-level-rise acceleration/deceleration will likely affect this variability both locally and globally. "We are looking for the conversation to continue," said **Sallenger**.

Thanks to such conferences as Coastal Sediments '11, the conversation does continue. "The USGS supports and con-



Guy Gelfenbaum (left) presents a student-paper award to **Sierd de Vries**, Section of Hydraulic Engineering, Delft University of Technology, the Netherlands. **de Vries** was one of three students recognized with awards at the meeting; his paper was titled "Dune Growth Trends and the Effect of Beach Width on Annual Timescales." In the center is **Julie Rosati** (U.S. Army Corps of Engineers), cochair of Coastal Sediments '11.



Kyle Kelso (left; USGS) shares USGS handout materials with a conference attendee.

tinues to build relationships with a global community of scientists through meetings like CS '11," said **Gelfenbaum**. "USGS involvement in this meeting has expanded the agency's visibility among an important network of scientific professionals. The network is highly diverse, including government engineers and research academics across international boundaries. This community is a platform for rich technical exchange that benefits all of us."

To learn more about Coastal Sediments '11, visit <http://coastalsediments.cas.usf.edu/>. ☼

▼ **David Twichell** (left) and **Nathaniel Plant** enjoy a moment to catch up on each other's work during a break in the technical sessions.



Workshop Examines Effects of a Rising Sea on Natural Systems of the Florida Everglades

By Thomas J. Smith III and
Helen Gibbons

More than 70 scientists and engineers from federal, state, and local agencies, universities, companies, and nonprofit organizations gathered in South Florida in April 2011 to participate in the workshop “Influence of Sea Level Rise on Natural Systems of the Greater Everglades.” Sponsored by the Florida Center for Environmental Studies, Florida Sea Grant, and the U.S. Geological Survey (USGS), the meeting was held April 5-7 at Florida Atlantic University in Boca Raton.

According to Florida Center for Environmental Studies Director **Leonard Berry**, the event was “no ordinary workshop, but a brainstorming session over three days” with the goal of better understanding the effects of sea-level change on the Greater Everglades and integrating those effects into conceptual ecological models. These models are planning tools used to identify major factors influencing natural systems and to show how those factors interact (for example, see http://www.clear.lsu.edu/conceptual_ecological_models/). The workshop findings are expected to aid Everglades restoration in the face of current and future sea-level change.

USGS supervisory ecologist **Ronnie Best**, coordinator of the USGS Greater Everglades Priority Ecosystems Science program, served on the planning committee, as did **Barry Rosen**, a biologist in the USGS Office of the Regional Executive-Southeast Area focusing on Everglades restoration.

The first half of the workshop was designed to provide participants with a common understanding of the changes in weather, hydrology, and sea-level rise anticipated as a result of climate change in South Florida. Of the 15 USGS scientists who attended, 7 gave talks during this part of the workshop.

(Everglades Workshop continued on page 8)

► *Mangroves killed by storm surge during Hurricane Wilma (2005) along the Everglades National Park coastline. Rising sea level exacerbates the effects of storm surge.*



One of **Tom Smith's** study sites on the Lostmans River in Everglades National Park, where mangroves are moving into a black needlerush marsh. This site contains a hydrology station for measuring surface and groundwater levels, temperature, and conductivity (related to salinity), as well as Surface Elevation Tables (SETs) for measuring changes in the elevation of wetland sediment.



Meetings, continued

(Everglades Workshop continued from page 7)

USGS research geologist **Tom Cronin** presented “A 10-Minute Primer on Rapid Sea-Level Rise” in the session “Big-Picture Perspective.” In the same session, USGS Mendenhall Research Fellow **Joseph Long** spoke about “Dramatic Events: Hurricanes, Storm Surges, and Other Pulse-Driven Events.”

USGS research hydrologist **Eric Swain** presented “Modeling Sea-Level Rise and CERP [Comprehensive Everglades Restoration Plan] Implementation” in the session “Hydrologic Response.”

USGS research ecologist **Tom Smith** opened the session “Biotic Response” with a talk titled “Coastal Communities—Mangroves: Sea-Level Rise, Hurricanes,

Cold Weather, What Next?” In the same session, USGS research geologist **Debra Willard** spoke on “Everglades Hydrologic and Biologic Response to Sea-Level Rise.” USGS biologist **Barry Rosen** presented “Overview of CEMs [conceptual ecological models]: Drivers, Stressors, and Link to Ecological Effects and Attributes,” and USGS geologist **Lynn Wingard** spoke about “MARES [Marine and Estuarine Goal Setting for South Florida] CEMs for Southwest Florida’s Coastal Wetlands and Impact of Sea-Level Rise on the Coastal Environment.”

During the second half of the workshop, participants broke into discussion groups to consider in greater

detail the anticipated effects of climate change and sea-level rise on Everglades ecosystems and to generate ideas on how to reduce negative impacts. The findings of each discussion group served as the basis for updating conceptual ecological models and may be used to guide future monitoring activities.

USGS participants in addition to those named above were ecologist **Don DeAngelis**, research ecologist **Kristen Hart**, research ecologist **Karen McKee**, supervisory wildlife biologist **Kenneth Rice**, ecologist **Stephanie Romañach**, research ecologist **Hardin Waddle**, and research wildlife biologist **Susan Walls**. ☼

Staff and Center News

USGS Taps the Florida Sun for Energy in St. Petersburg

By Aaron Dalley

In line with the U.S. Department of the Interior (DOI) strategy to reduce its environmental footprint, the U.S. Geological Survey (USGS) St. Petersburg Coastal and Marine Science Center in St. Petersburg, Florida, is installing a new solar-heating system. The new system will supplement the current boiler with evacuated-tube solar collectors to provide heat in the winter and reheat conditioned air in the summer.

The solar collectors are being installed on the newest USGS building in the C.W. Bill Young Marine Science Complex, which houses the USGS and several other ocean-science institutions in St. Peters-

burg (see related *Sound Waves* article at <http://soundwaves.usgs.gov/2008/06/staff5.html>). Designed by USGS operations manager **Terry Kelley** and constructed in 2005, the building is cooled with water received from the nearby University of South Florida, St. Petersburg. The chilled water, at around 40°F, passes through radiators in the ventilation system just as compressed refrigerant would in a standard air-conditioning system. Because the resulting air is very cold, a reheat system employs a heated-water radiator to warm the air and control the final temperature. The result is continuously circulating air of optimum temperature, important because the building contains several laboratories.

“We recycle some of the cool air before it exits the building and must use 100-percent recirculated air for the lab environment,” said **Kelley**. The necessary recircu-



Workers from St. Pete Solar Energy install a supporting structure designed to withstand hurricane-force winds.



Concrete footers will support an elevated array of evacuated-tube solar collectors to supplement the natural-gas boiler (green boxlike structure at back).

lation and Florida’s high humidity require that the air be cooled even in the winter.

The existing natural-gas boiler used for heat and reheat not only contributes to the center’s carbon footprint but also costs about \$800 a month to run. The new system will significantly reduce natural-gas consumption and integrate almost seamlessly into the existing mechanics of the building. The evacuated-tube system uses no fossil fuels and is expected to make up the cost of the parts and installation in 4 to 6 years.

(Solar Energy continued on page 9)

(Solar Energy continued from page 8)

St. Pete Solar Energy is installing the new solar collectors and built the structure supporting the array of tubes. Positioned above the boiler to allow for easy connection to the existing storage tank, the evacuated tubes function considerably differently than the photovoltaic solar systems that are usually installed, said St. Pete Solar Energy President **Barry Flaherty**.

"Photovoltaic actually works on an atomic level. A photon, a little packet of energy from the sun, actually strikes an atom and excites certain electrons that want to go somewhere else," **Flaherty** explained. "There's a positive and a negative side to the solar cell, so when the photon strikes that electron, it wants to go to the other side, and creates current."

In contrast, evacuated-tube technology takes advantage of the wave properties of light rather than its particle properties. The evacuated tubes consist of a copper "heat pipe" in the center with two flat aluminum absorber plates attached. The absorber plates are sprayed with an aluminum nitride coating to maximize the absorption of radiation energy of the sun. This heat is then circulated within the heat pipe via a salt and synthetic-oil substance up to a header pipe where the heat is transferred to the water. The heat pipe and absorber plates are surrounded by



One of the evacuated tubes, containing two flat, aluminum absorber plates on opposing sides of a heat pipe. The plates have been sprayed with an aluminum nitride coating to maximize absorption.

a vacuum tube made of borosilicate glass, similar to laboratory glassware, with the air removed. Removal of the air inside the tube reduces the effect of outside weather conditions and is the "evacuated" part of evacuated tubes.

Flaherty will be working with **Frank Derkovitz**, facility maintenance manager, to fine-tune the system and meet the needs of the center. "It's all about temperature rise, and we really don't know how much we're going to get," **Flaherty** said. "There are so many variables in this, so I like running it in real time."

Flaherty will be installing several temperature probes to measure temperature change at various points and valves to allow for different configurations in the flow of the system. Once the outside configuration is finalized, the primary method of regulating the heat will be controlling the flow of the water. Increasing the rate at which the water flows across the heat exchanger, for example, will decrease the amount of heat that is absorbed.

"Once it's up and running, we'll find an optimum value for it with the water pumps," said **Kelley**, who organized bringing the solar tubes to the facility and recently retired this year after 43 years with the USGS.

The solar installation should be up and running by the end of summer. This project reflects the DOI's recently released strategic plan, *Building a 21st Century Department of the Interior*:

"... to reduce Interior's environmental footprint over the coming years with a goal to incorporate sustainable practices throughout and more effectively utilize resources and protect the environment." ❁



▲ *Water will flow through the horizontal header tubes and transfer heat energy from the evacuated tubes to the storage tank below.*



The evacuated tubes will be fastened to the triangular frames at the top of the supporting structure, at an angle optimized for circulation of the heat-transferring materials.



To fill gaps and maximize heat transfer, the end of the heat pipe is coated with thermal compound before it is inserted into the header tube. Installation of the new system is scheduled to be complete by the end of summer.

Summer Intern Working with Underwater Video Data from the Hawaiian Islands

U.S. Geological Survey (USGS) scientists who study Hawaiian coral reefs recently welcomed summer intern **Peter Tierney** to the Pacific Coastal and Marine Science Center in Santa Cruz, California. **Tierney** was selected for the internship by the USGS/NAGT (National Association of Geoscience Teachers) Cooperative Field Training Program, which annually places teacher-nominated students into USGS field, laboratory, and office positions throughout the country for internships lasting as long as 5 months.

Under the guidance of geologists **Susie Cochran** and **Ann Gibbs**, **Tierney** is processing underwater video footage collected in Hawaiian coastal waters during the past few years. **Cochran** and **Gibbs** are members of the USGS Ridge to Reef group, a team of biologists, geologists, and hydrologists from four USGS science centers who collaborate with local communities and agencies in Hawai'i to understand the sources and impacts of land-derived sediment and pollutants on nearshore coral reefs. Digital video is one of the tools they

***Peter Tierney** holds one end of a survey tape at the edge of some mangrove trees in the Virgin Islands.*

use to gather data.

Tierney is well suited for working with scientific imagery, having graduated from Williams College (Williamstown, Massachusetts) with Bachelor's degrees in geology and art. His undergraduate field studies included mapping modern reefs in the Virgin Islands and Pleistocene reefs in Baja California. After graduating in 2010, he decided to take a year off before heading to graduate school.

"I spent a few months working for a fashion/product photographer," says **Tier-**

ney, "and

also worked at the American Museum of Natural History as a volunteer teacher, talking to classes and tourists about geology, paleontology, and marine biology and ecology." He adds, "It was a cool job, to be sure, but I traded in my AMNH vest for the opportunity to examine issues affecting modern coral reef systems." In September, **Tierney** will move on to graduate studies at the University of Chicago.

Cochran was pleased to recruit a USGS/NAGT

***Peter Tierney** (right) using an underwater quadrat to collect data in the Virgin Islands.*



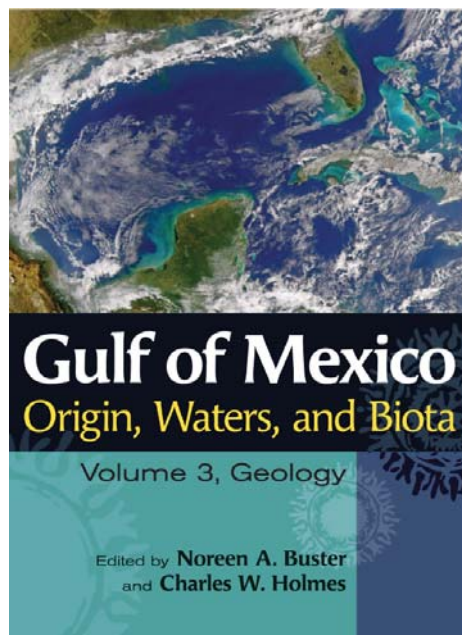
intern for the summer, as she herself is a former USGS/NAGT intern. She states, "My summer internship with the Coastal and Marine Science Center in St. Petersburg, Florida, was one of the highlights of my USGS career. I split time between two different projects under the mentorship of **Jack Kindinger** and **Bob Halley** and was exposed to several different methods of data collection and analysis. Many of the skills I learned that summer have carried through in my work to this day."

To learn more about the USGS/NAGT Cooperative Field Training Program, visit http://nagt.org/nagt/programs/usgs_field.html. To learn more about the USGS Ridge to Reef Project, visit http://biology.usgs.gov/pierc/Pollution_and_Ecological_Restoration.html, and to learn more about USGS Pacific Coastal and Marine Science Center research within the Ridge to Reef Project, visit <http://coralreefs.wr.usgs.gov/>. ❁

New Book Offers Comprehensive Description of Gulf of Mexico Geology

The recently published *Gulf of Mexico Origin, Waters, and Biota, Volume 3, Geology* provides the most up to date, systematic, cohesive, and comprehensive description of the geology of the Gulf of Mexico Basin. This new book is the latest in a landmark scientific reference series from the Harte Research Institute for Gulf of Mexico Studies (<http://www.harteresearchinstitute.org/>). The six sections of the book address the geologic history, recent depositional environments, and processes offshore and along the coast of the Gulf of Mexico.

Scientific research in the Gulf of Mexico region is extensive and has broad-based influence upon scientific, governmental, and educational communities. This volume is a compilation of scientific knowledge from highly accomplished and experienced geologists who have focused most of their careers on gaining a better understanding of the geology of the Gulf of Mexico. Their research, presented in



this volume, describes and explains the formation of the Gulf Basin, Pleistocene and Holocene stratigraphic and sea-level

history, energy resources, coral reefs, and depositional processes that affect and are represented along our gulf coasts. The volume provides valuable synthesis and interpretation of what is known about the geology of the Gulf of Mexico. Of 51 contributing scientists, 16 represent studies by the U.S. Geological Survey (USGS).

Five years in the making, this monumental compilation is both a lasting record of the current state of knowledge and the starting point for a new millennium of study.

The volume was edited by **Noreen A. Buster**, a geologist at the USGS St. Petersburg Coastal and Marine Science Center in St. Petersburg, Florida, and **Charles W. Holmes** (USGS, retired), who specializes in geochemistry and sedimentology, focusing on geochronological issues. **Holmes** is currently executive director of Environchron, LLC, and adjunct professor at Eckerd College in St. Petersburg, Florida. ☼

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